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W-8000 München 5(DE)(54) **Greenhouse.**

(57) A greenhouse, to be provided in a window opening, includes an enclosed housing, a watering control means, a temperature control system, a humidity control means, and a lighting system. The enclosed housing having a plurality of window panes respectively mounted thereof. The watering control means includes a liquid receptacle, a water flow control

valve, a pipe member, and a watering control circuit thereof. The lighting means includes a plurality of lamps to assist the plants to process the photosynthetic reactions, and a plurality of reflectors which may be supplement lighting devices and may produce a kaleidoscopic effect after a series of reflections of the plants.

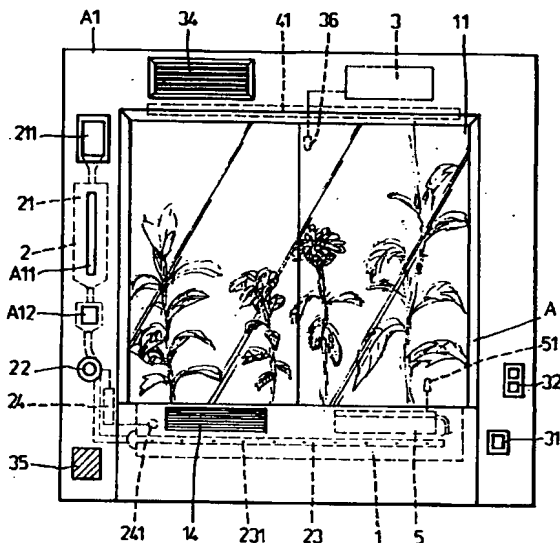


FIG.1

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

This invention relates to a greenhouse to be mounted on a window opening, more particularly a greenhouse to grow plants at any places and under any climate conditions. More particularly, the invention promotes living standard and provides fresh air. Mostly, the invention may be treated like a paint on a wall or a screen partition.

### 2. Description of the Related Art

Window gardens, or ornament plants grown in receptacles provided in the windows of the home, are a common sight among households, especially those households located in crowded and polluted locations.

Aside from making aesthetic contributions, the oxygen released from the photosynthetic reactions of the plants serves as a source of fresh air. However, since the receptacles containing the ornament plants are merely placed on the windowsill, the ornament plants are susceptible to damage from inclement weather conditions. Furthermore, most plants can not survive in extremely cold temperatures, which, in temperate climates, are typical during the winter and autumn seasons.

## SUMMARY OF THE INVENTION

Therefore, the objective of the present invention is to provide a greenhouse to be mounted on a window opening, said greenhouse protecting the plants from bad weather and maintaining the temperature of the plants' immediate environment within an appropriate temperature range, thus ornament plants may grow regardless of seasonal weather conditions.

Accordingly, a greenhouse of the present invention includes an enclosed housing mounted on the window opening. The enclosed housing has a window pane fixedly mounted on the outer side of the window opening, a transparent board fixedly mounted on the inner portion adjacent to the outer window pane preferably made from plastic material which has a poor temperature conducting so as to maintain the immediate surrounding temperature in a certain preferred temperature range, two openable panes laterally attached to the two sides of the fixed window pane to allow fresh air to flow into the enclosed housing, and two openable window panes hingedly attached to the inner side of the window opening. The windowsill of the window opening is provided with an elongated groove serving as a plant box to contain soil to grow plants. The plant box is accessible through the inner win-

dow pane. The greenhouse, further, includes a watering control means which may either be connected to a water faucet through a pipe member or to a receptacle of its own to supply water for the plants, a watering pipe member communicated with the water source and extending into the plant box, and a valve to control water flow from the water source to the pipe member. A surrounding temperature control means is similarly included in the enclosed housing for sensing surrounding temperature, a cooling means to maintain the surrounding temperature below a maximum temperature requirement, a heating means to maintain the surrounding temperature above a minimum temperature requirement. A humidity control means to detect humidity of the enclosed housing A and maintain the humidity within a preferred limit. The greenhouse, further, includes a plurality of elongated lamps mounted in the enclosed housing and served as artificial light for the plants, and a plurality of reflectors to reflect light and to reflect the plants. The series of reflection of plants may result of a kaleidoscopic effect.

## BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, together with the foregoing, are attained in the embodiment of the invention described in the accompanying description and illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view of the present invention;

FIG. 2 is a top view of the present invention;

FIG. 3 is a schematic diagram of FIG. 1 showing a relationship between the structure and the wiring system of FIG. 1;

FIG. 4 is a block diagram of a temperature control means of FIG. 1;

FIG. 5 is a block diagram of watering control means of FIG. 1;

FIG. 6 is a block diagram of a humidity control means of FIG. 1;

FIG. 7 is a perspective view of the present invention showing a second embodiment;

FIG. 8 is a watering means of the present invention showing a second embodiment; and

FIG. 9 is a perspective view of the present invention mounted on a window opening taken from outside.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning to the drawings and referring first to figs. 1 & 2 of the present invention which comprises an enclosed housing A, a plant box 1, a watering system means 2, a temperature control means 3, a lighting means 4, and a humidity con-

trol means 5.

The enclosed housing A is able to be positioned at variety places depending upon the needs. Such as to be mounted on a wall unit, on a window opening, or even to stand on a ground by itself as a screen. This specification will take an enclosed housing mounted on a window opening as an embodiment. A windowsill of the window opening is provided with an elongated groove which is filled with soil for planting purpose and is referred to as plant box 1 hereinafter. The enclosed housing A includes two inwardly openable window panes 11 hingedly mounted on the inner side of the window opening, a fixed window pane 12 mounted on the outer side of the window opening having two openable window panes 13 laterally mounted to two sides of the outer window pane 12 thereof, a transparent board 12', preferably made from plastic material, mounted on the inner portion adjacent to the outer window pane 12, a panel A1 mounted to the front portion of the enclosed housing A, and a ventilator 14. All window panes have being treated with reflecting material at their inner ends as light supplement with but one exception, the transparent board window 12' which is adapted to isolate surrounding temperature. The immediate spacing area between the outer window pane 12, and the transparent board 12' may be filled with air, water or any other material that can isolate heat or chilly weather.

The watering system means 2, according to FIGS. 1, and 3, is composed of a water receptacle 21 fixedly mounted behind one side of the panel A1 having a transparent longitudinal window A11 at front to indicate liquid contained in the receptacle 21, a water flow control valve 22 coupled to the receptacle 21 through a monitor A 12 is controlled by a watering control circuit 24 to supply water to soil through a series of discharge ports 231 extending along the surface of a pipe member 23 which is connected to the valve 22. The pipe member 23 is embedded in the soil of the plant box 1.

The watering control circuit 24 as shown in FIG. 4, located behind the panel A1 comprises a signal amplifier 242, a comparator 243, a circuit protector 244, a signal generator 245, a driver 246, and a load 247. Upon the sensor 241 encodes detected information of water contained in the soil into a signal and sends to the comparator 243 through signal amplifier 242 for comparison with a predetermined signal which has defined a basic requirement of water to be contained in soil. Should water contained in the soil is above the standard requirement after comparison, the comparator 243 will bypass the signal to ground. However, should water contained in the soil is less than the basic requirement after comparison, the comparator 243 will trigger the signal generator

245 to activate the driver 246 to energize the control valve 22 to supply water into soil through the discharge ports 241 of the pipe member 24. Once water contained in the soil is compared larger or equal to the basic requirement, the comparator 243 will bypass the signal to ground and the control valve 22 stops pumping water into the soil through the pipe member 24. A circuit protector 44 will cut the main power source to protect the circuit from being overload.

The watering system may be connected to a water faucet to supply water to the soil in a predetermined time with a predetermined quantity or may be supplied manually.

The temperature control means 3, according to FIGS. 1 and 3, includes a main power switch 31, a fan switch 311, an exhausting fan 32 on top of the enclosed housing A, a temperature control circuit 33 behind the panel A11, an exhausting fan 34, a heating fan 35 at bottom portion of the housing A, and a sensor 36.

The temperature control circuit 33, according to FIG. 3, is connected to the power switch 31, through a circuit breaker 37, and to the fan switch 32, the exhausting fan 34, the heating fan 34, the heating fan 35. The exhausting fan 34 and the heating fan 35 are controlled by the temperature control circuit 33 automatically or controlled by manually.

The temperature control circuit 33, according to FIG. 5, is composed of a sensor 36, a signal amplifier 332, a comparator 333, a circuit protector 334, a signal generator 335, a driver 336, and a load 337. The sensor 36 has one end attached to the inner portion of the enclosed housing A to detect temperature contained within the housing A. Upon the sensor 36 transmits the detected immediate surrounding temperature within the enclosed housing A to the comparator 333 via the signal amplifier 332, the signal will be compared with a prestored signal within the comparator 333 which defines a preferred temperature range between 12 to 29 degrees centigrate. Should the sensed immediate surrounding temperature is within the preferred temperature range after comparison, the comparator 333 will bypass the signal to ground. Should the immediate surrounding temperature is larger then the preferred temperature range, the comparator 333 will output a signal via the signal generator 335 to the driver 336 to activate the exhausting fan 34 to drop the temperature within a preferred temperature range. When the temperature detected is dropped within the preferred temperature range, the comparator 333 will stop transmitting signal to the driver 336 thus, the fan 34 is turned off. On the contrary, should the temperature detected by the sensor 36 is less than the preferred temperature range, the driver will be trig-

gered to drive the heating fan 35 to increase the temperature within the enclosed housing A.

It is to be noted that the exhausting fan 34 and the heating fan 35 are manual operable by the fan switch 311.

The humidity control means 5, according to FIG. 6 having a humidity control device 51 which is a sensor, a signal amplifier 511, a comparator 512, a circuit protector 513, a signal generator 514, a driver 515, and a load 516. The load may include a mist spray 52 and the exhausting fan 34. Upon detecting the humidity of the enclosed housing A, the sensor 51 encodes the information into a signal and transmits to the comparator 512 via the signal amplifier 511 for comparison with a predetermined signal which defines a preferred humidity limit and which may vary depending upon the plants. Should the humidity of the enclosed housing A is higher than the predetermined humidity limit after comparison, the comparator 512 will bypass the signal to ground. Should the detected humidity is less than the predetermined humidity limit after comparison, the comparator 512 will trigger the driver 515 through the signal generator 514 to activate the exhausting fan 34 and the mist spray 52 to spray water into the enclosed housing A to increase the humidity. Upon the detected humidity has reached to the reading as predetermined, the comparator 512 will bypass the signal to ground, thus the driver 515 is deactivated and the load 57 is turned off.

The mist spray 52 may be an ultrasonic device to spray mist into the enclosed housing A, as illustrated, or may be a water basin having a fan thereunder to blow water into the housing A.

The lighting means 4 includes two, but not limited to, elongated lamps 41 respectively mounted to the top and the bottom portions of the enclosed housing A, and plural reflectors 42 so as to reflect light as lighting supplement. The window panes, as previously described, being processed with special treatment at their inner portions may also reflect light and plants growing in the enclosed housing as well. The refraction of the window panes can produce a kaleidoscopic image.

FIG. 7 is another embodiment of the present invention which is a screen like greenhouse and has the receptacle 21, the watering control circuit 24, and the temperature control circuit 33 installed in a closet under the enclosed housing A, and has changed the water control valve 22 into a pump 22 which also controls water supply both to the soil and the humidity control system 5. The attachment of two pictures provides a better view of the present invention mounted at different places for different purposes.

Referring now to FIG. 8, a second embodiment of the watering means 2 of the present invention.

The liquid receptacle 21' may be filled with a plurality of heating elements 212 adapted to prevent liquid from freezing at places where temperature may be dropped below the minimum requirement. The pipe member 23' may also be wrapped up with temperature protective element 231', such as styrofoam material, adapted to prevent heat from loosing.

Therefore, while a particular embodiment has been shown and described, other embodiments will be apparent to those skilled in the art and therefore it is not intended that the invention be limited to the disclosed embodiment or to details thereof and departures may be made therefrom within the spirit and scope of the invention.

### Claims

1. A greenhouse fixedly mounted on a window opening having a windsill, an inner side, and an outer side and comprising:

an enclosed housing fixedly mounted on said window opening having a first window pane securely mounted to said outer side of said window opening, a second openable window pane mounted to said inner side of said window opening, and third two openable window panes with one each laterally mounted to each side of said first window;

an elongated plant box formed as bottom portion of said enclosed housing containing soil to grow plants;

a watering means mounted on said enclosed housing adjacent to said second openable window pane having a liquid receptacle, a water flow control valve, and a pipe member; wherein said liquid receptacle contains liquid for irrigating plants through said water flow control valve and then discharged from said pipe member; and wherein said pipe member has plural discharge ports spaced therealong;

a thermostat control means fixedly mounted on said enclosed housing adjacent to said second openable window pane including means for sensing immediate surrounding temperature;

a cooling means actuated by said sensing means;

a heating means actuated by said sensing means;

a lighting means being provided within said enclosed housing as artificial light to the plants for photosynthetic reaction;

2. A greenhouse according to claim 1, wherein said heating means composes of a heating fan; said cooling means composes of an exhausting fan.

3. A greenhouse according to claim 3, wherein said auxiliary cooling means composes of a second glass fixedly mounted to the outer window opening spacing from said fixedly window pane; said spacing being added with air, water, or any heat resistant liquid. 5
4. A greenhouse according to claim 1, wherein said watering means composes of a control device having a sensor embedded in the soil detecting water containing in the soil and controlling said water flow control valve. 10
5. A greenhouse according to claim 1, wherein said lighting means composes of a plurality of elongated lamps mounted in said enclosed housing, and a plurality of reflectors mounted in said enclosed housing. 15
6. A greenhouse according to claim 1, wherein a second heating means composes of plural heating elements mounted on said liquid receptacle, and of temperature protective element wrapt up said pipe member. 20
7. A greenhouse according to claim 1, wherein said enclosed housing composes of a humidity control means mounted on said plant box to maintain humidity requirement within said enclosed housing. 25 30

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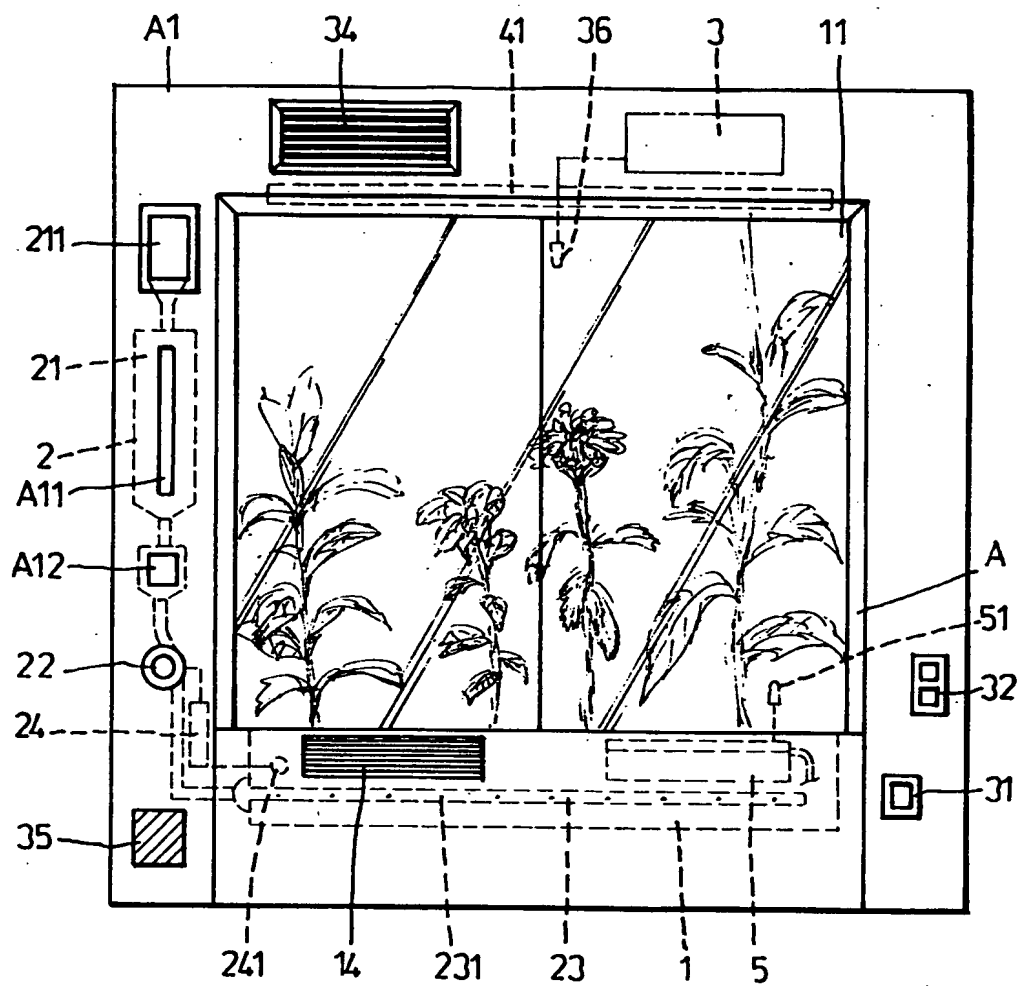


FIG.1

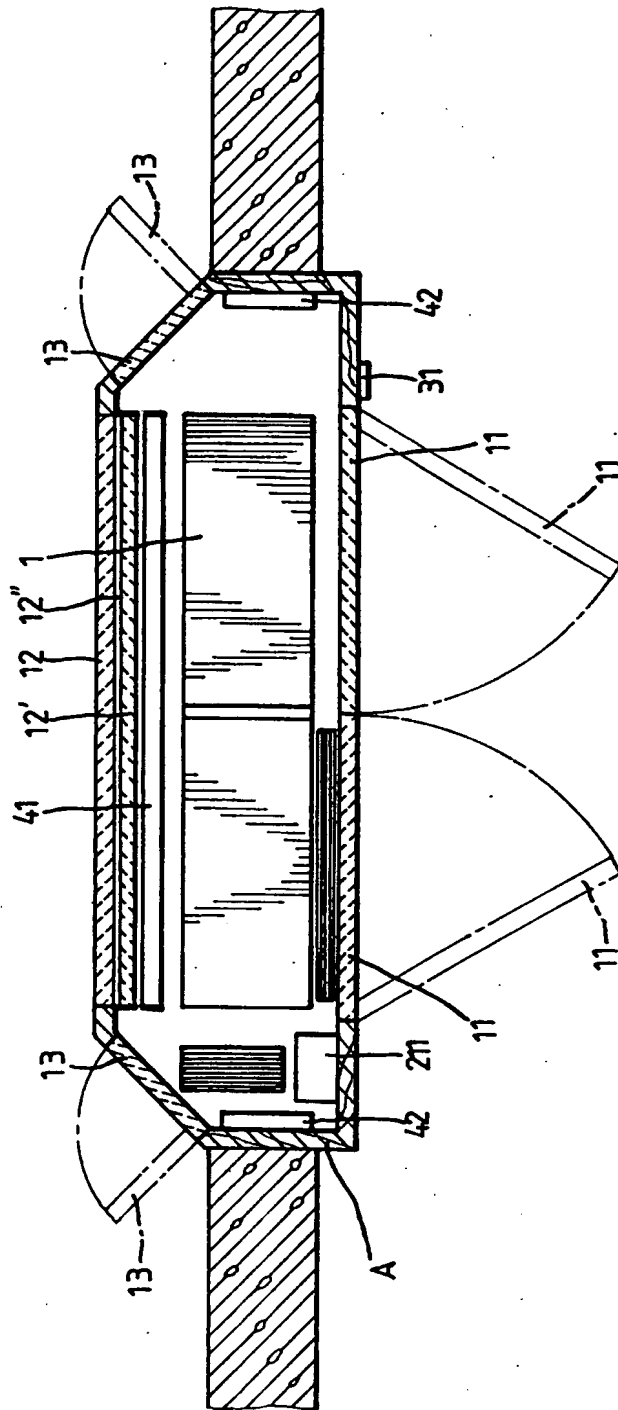


FIG.2

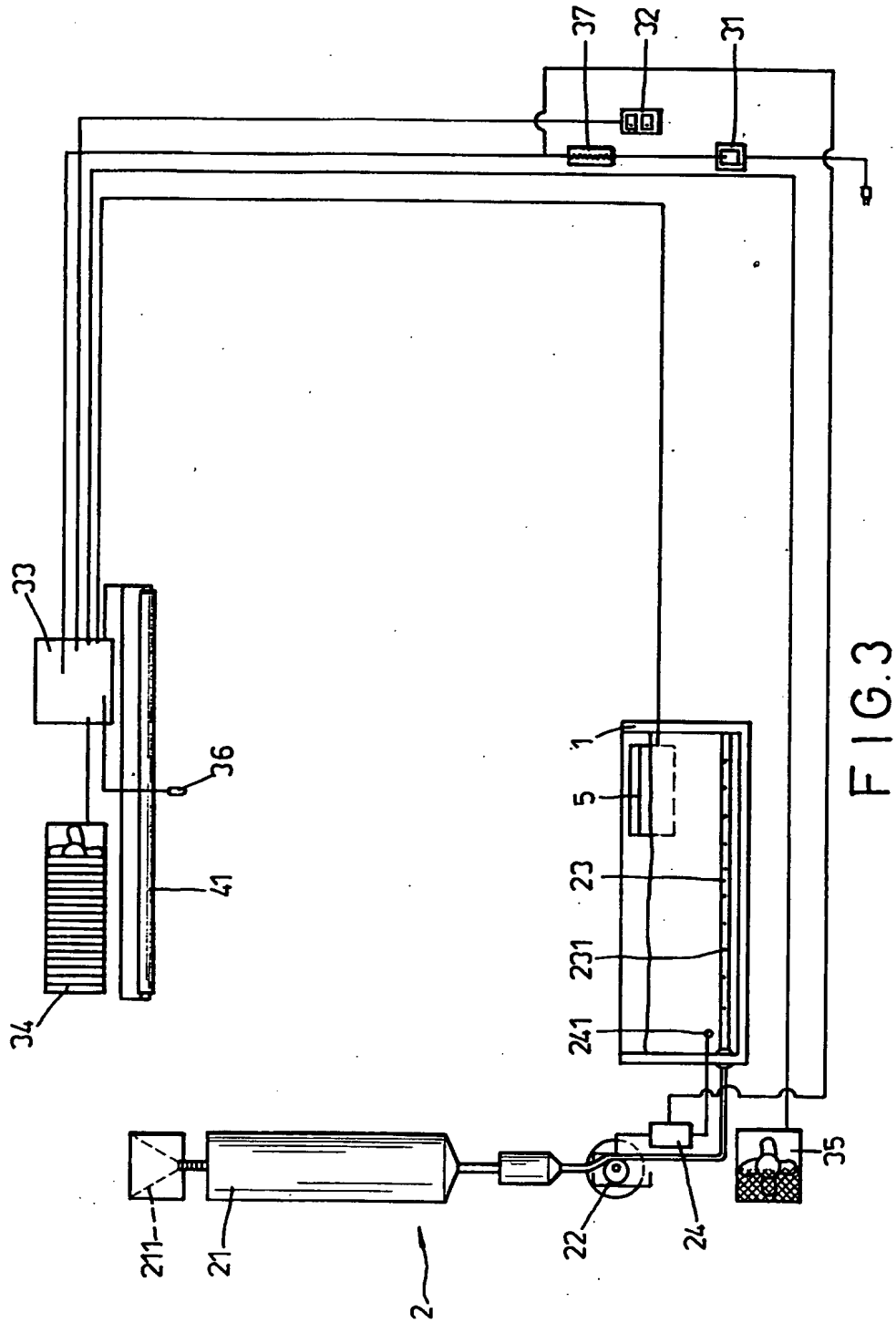


FIG.3



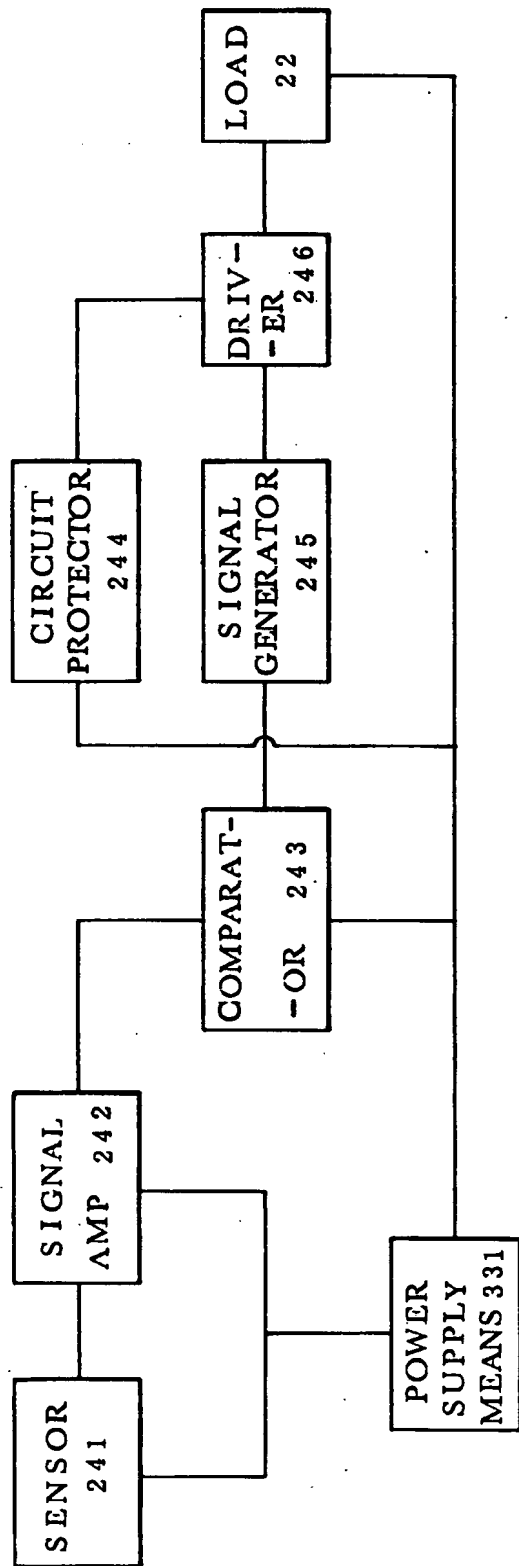


FIG.4

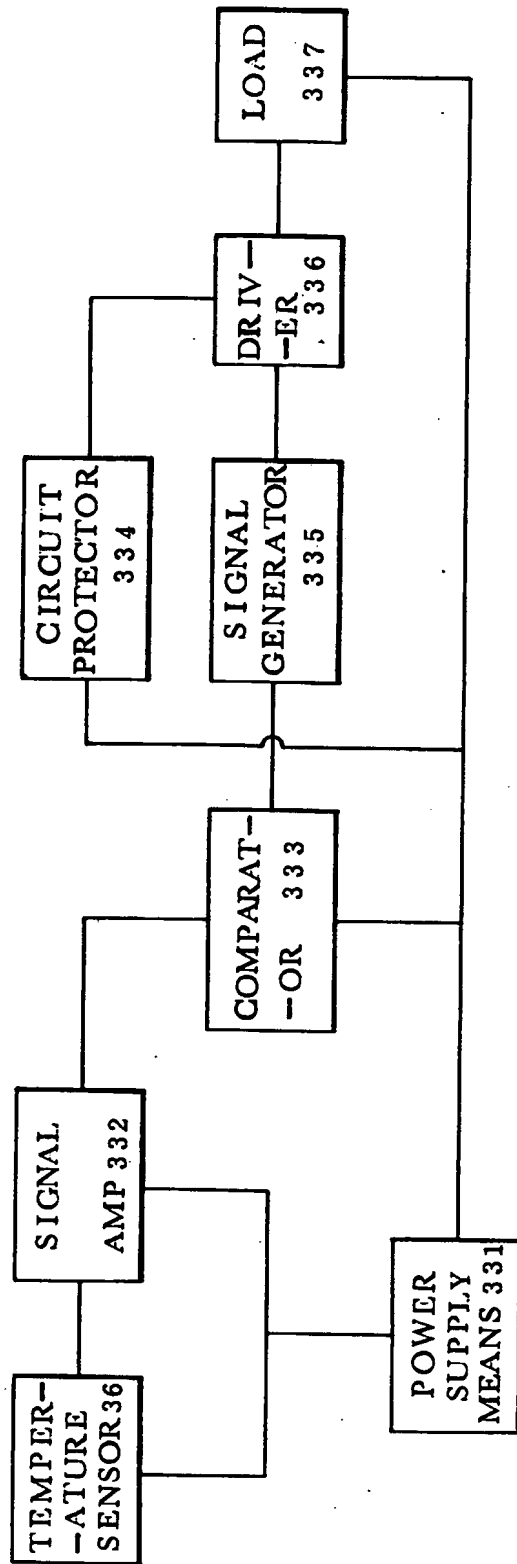


FIG. 5

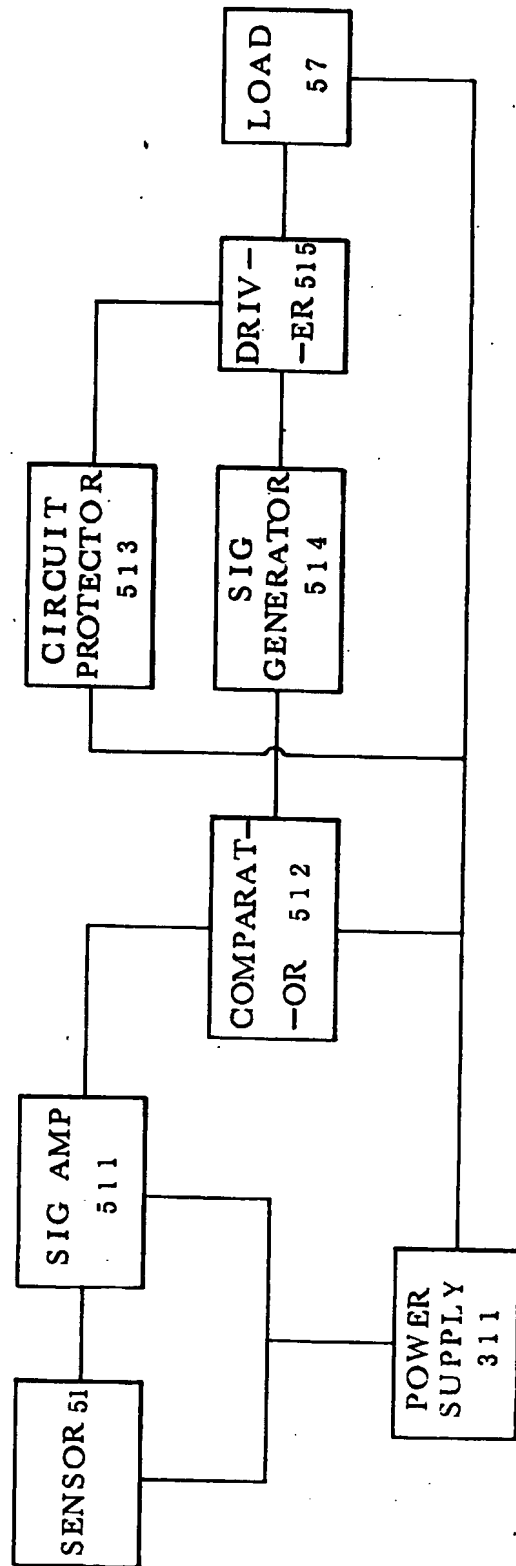


FIG.6

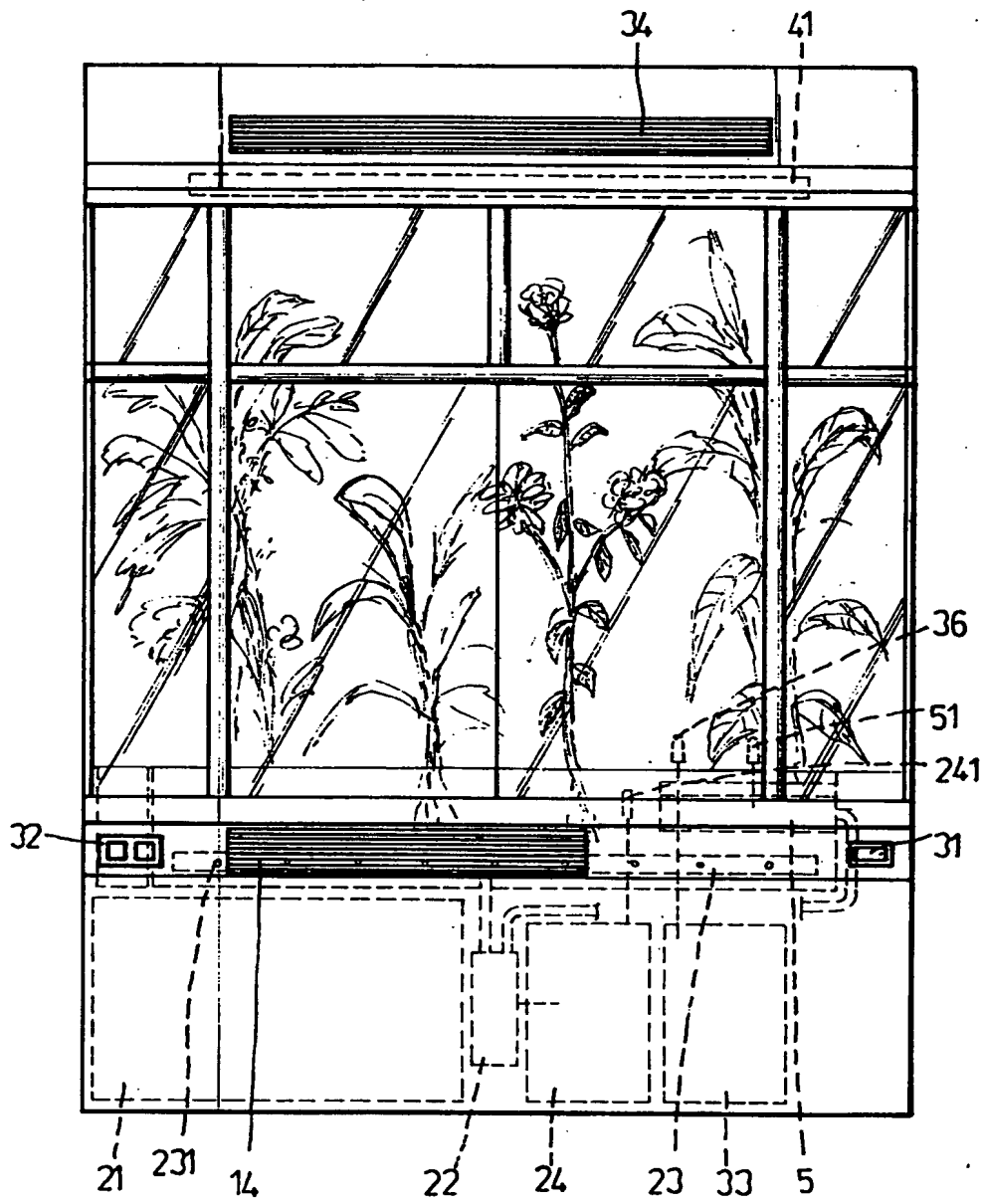


FIG. 7

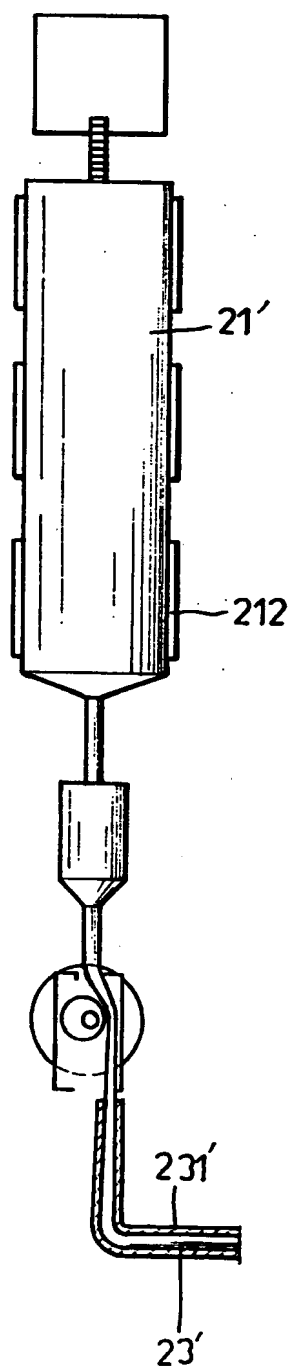


FIG. 8

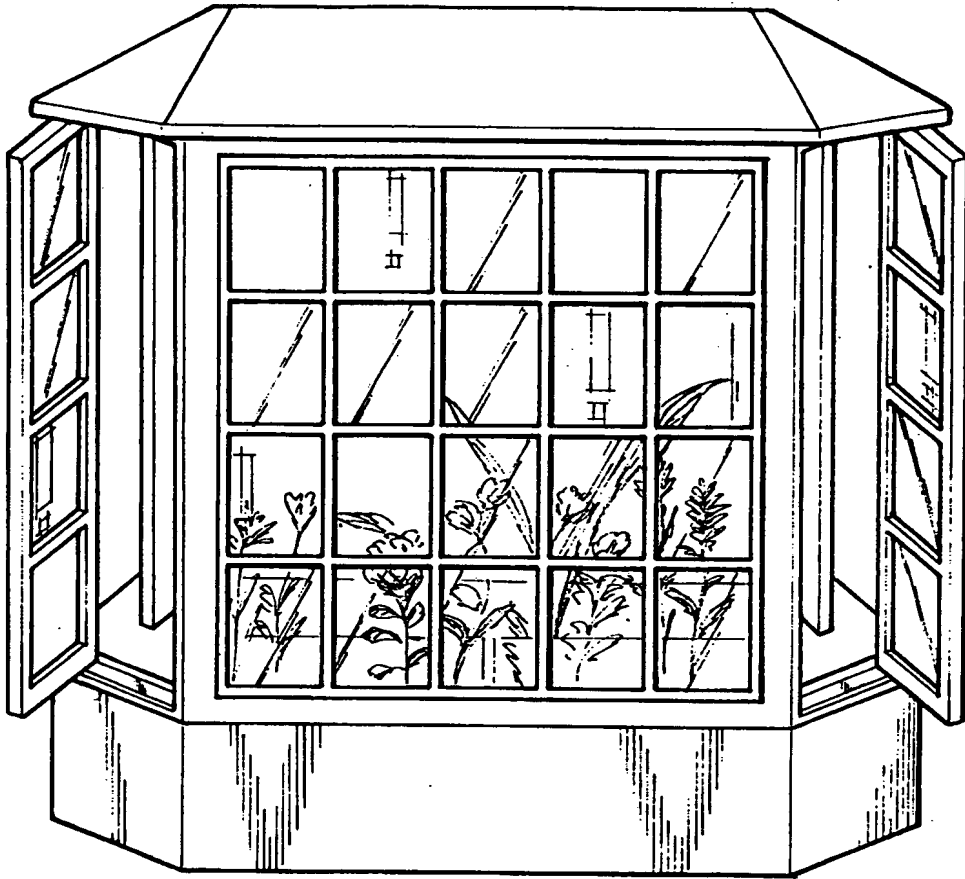


FIG.9



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## EUROPEAN SEARCH REPORT

Application Number

EP 91 11 2813

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-2 238 220 (COX) * page 3, paragraph 1 -paragraph 2; claims 1,9; figures 1-3 *	1	A01G9/14
A	GB-A-2 147 043 (PINK) * the whole document *	1	
A	US-A-4 038 791 (ATKINSON) * column 4, line 38 - column 9, line 60; figures 1-13 *	1	
A	GB-A-1 374 647 (SWEETINBURGH) * the whole document *	1, 4, 5	
A	GB-A-1 402 261 (PROTAG (MECHANICS)) * the whole document *	1	
A	US-A-4 023 306 (RUGGIERI) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A01G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 31 MARCH 1992	Examiner HERYGERS J.J.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	